Henday Converter Station Upgrade

Environmental Impact Assessment Status Report

Conawapa to Winnipeg Power Transmission Complex

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Manitoba Hydro is currently pursuing a number of long-term capital investment and conservation initiatives. These are intended to meet projected consumer needs into the next century and to improve the security and reliability of the province's electrical system.

Part of Hydro's capital plan is to build the 1390 megawatt Conawapa Generating Station on the Nelson River, downstream of the soon-to-be-completed Limestone project. This facility will generate needed power for both projected demand within Manitoba and committed sales to Ontario and the United States.

Also proposed is development of the Conawapa-Winnipeg Power Transmission Complex, known technically as the Bipole III Complex.

The Conawapa-Winnipeg Power Transmission Complex

This major development includes five interrelated transmission and conversion facilities:

- An upgrade of the existing Henday Converter Station on the Nelson River;
- An estimated 850-kilometre HVDC (High Voltage Direct Current) transmission line from Henday to Winnipeg, known as Bipole III;
- A new converter station east of Winnipeg, known as Riel Converter Station;
- A transmission link between Riel and the existing Dorsey Converter Station northwest of Winnipeg; and
- Upgrades to Hydro's high voltage 230 kilovolt (kV) Southern Receiver System serving Winnipeg and southern Manitoba.

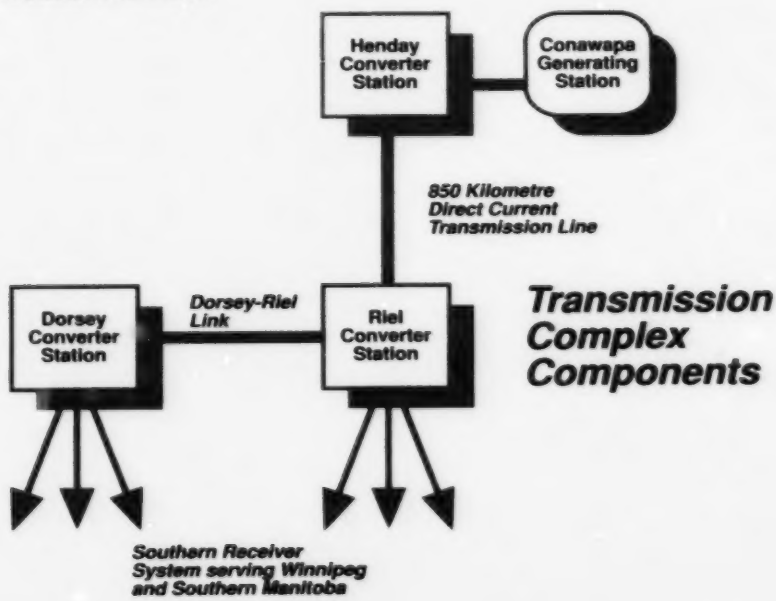
Purposes

This Transmission Complex has three purposes:

- To convey Conawapa or other northern power to Hydro's receiving system in southern Manitoba;
- To increase the flexibility of Hydro's transmission network during normal operations; and
- To improve Hydro's capacity to service its customers in the event that part of its network is disrupted by an outage or by maintenance requirements.

The Henday Converter Station Upgrade Study

This booklet describes work done to date on the Henday Station Upgrade. Over the past year, Manitoba Hydro and its consultant team have been assessing the potential environmental impacts associated with this project.



The Henday Upgrade involves four basic elements:

- Extension of the AC (alternating current) switchyard for termination of the 230 kV transmission lines from Conawapa.
- Development of additional AC/DC conversion facilities.
- Construction of an additional DC switchyard to provide connections for Bipole III.
- Construction of a new electrode line to an existing grounding site southwest of Henday.

The incoming 230 kV transmission lines from Conawapa and their environmental impacts will be discussed in a separate environmental assessment study of the Conawapa Generating Station. The outgoing 500 kV HVDC transmission line from Henday to the proposed Riel Station (Bipole III) will be the subject of separate corridor, route and environmental assessment reports.

Conclusions

The Henday Upgrade project will ensure that the station can adequately transmit power from Conawapa or other northern generating facilities to southern Manitoba. The project involves improvements to an existing and operating Hydro facility.

The environmental impacts of the Henday Upgrade are generally not significant and will add very little to earlier or existing impacts. Many project impacts are largely construction-related and, therefore, relatively short-term. Longer-term operational effects will be insignificant and incremental to Manitoba Hydro's current operations at the site. Adverse effects that could occur are considered mitigable with the use of existing and proven technology.

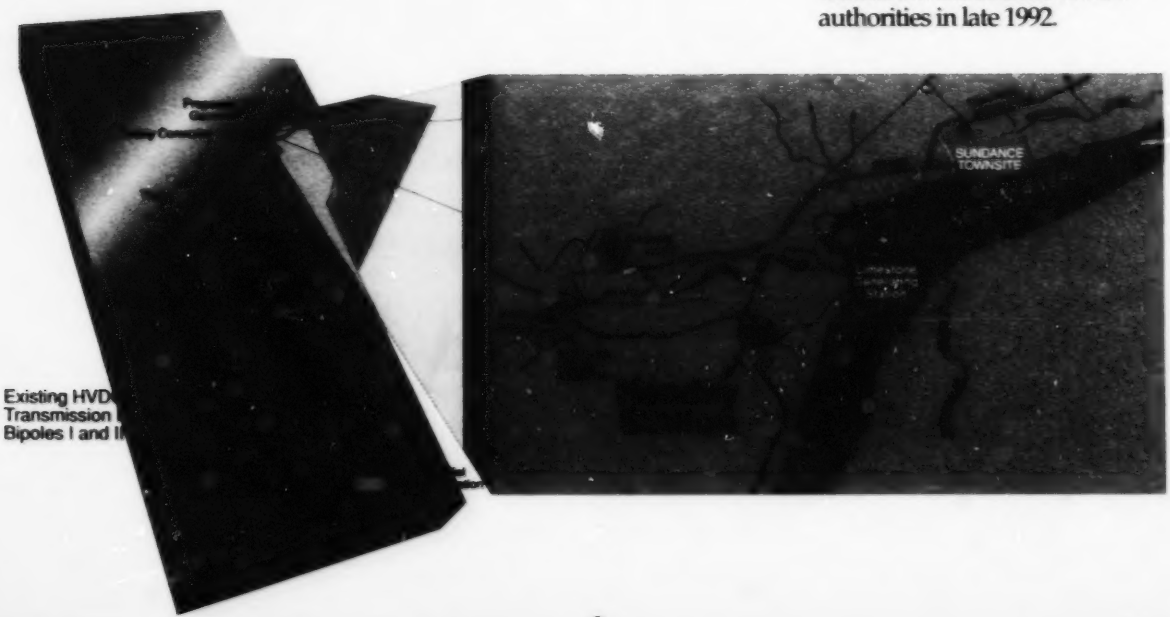
This booklet describes how and why the above judgments were made.

Public Review and Consultation

This status report provides an information base for public and community consultation on the proposed Henday Upgrade. More detailed information will be available from Hydro's Environmental Management Division as the study proceeds.

Beginning later in 1992, Hydro's representatives will hold community open houses and other meetings in northern Manitoba to discuss environmental issues related to the Henday Upgrade. Manitoba Hydro welcomes public discussion and comment on its analysis and conclusions. Band and non-treaty residents, environmental groups, government officials, and other interested parties are invited to participate.

Feedback received during these meetings will assist Hydro in its preparation of the final Henday Environmental Impact Statement to be submitted to provincial and federal environmental review authorities in late 1992.



Existing HVD
Transmission
Bipoles I and I

Henday Converter Station Upgrade

Delivery of power from the proposed Conawapa Generating Station and other northern power sources will require conversion of the alternating current (AC) produced at Conawapa to direct current (DC) for transmission to southern Manitoba. This conversion will take place at Henday.

Henday will also be the northern origin of a new high voltage direct current (HVDC) transmission line, known as Bipole III. Hydro is currently examining alternative corridor locations for this line. Bipole III will connect Henday with the proposed Riel Converter Station just east of Winnipeg, where the DC power will be re-converted to AC power for distribution to provincial and extra-provincial customers. Henday Station now functions in a similar way relative to Bipole II by converting AC power generated at Limestone and Long Spruce stations to DC power for transmission to Dorsey Converter Station northwest of Winnipeg.

Role Within Hydro's Transmission Network

Essentially, Henday Converter Station must be upgraded to enable power from Conawapa and other northern generating sources to be transmitted to southern Manitoba. The Upgrade will also provide an emergency backup to the HVDC transmission system, in the event of a disruption, by enabling transfer of power between Bipole III and the existing Bipole II.

Station Design

Final engineering design for the proposed Henday Station Upgrade is not expected to be completed until 1997. In general, the following changes to the existing station will be required.

Expanding the Existing 230 kV AC Switchyard

The existing 230 kV AC switchyard at the southeast end of the site, which now receives power from Limestone and Long Spruce, will be expanded to the north to process the additional power expected from Conawapa and other northern power sources. Ultimately, terminations of four additional 230 kV transmission lines will be constructed, and eight additional large converter transformers will be installed.

After full AC switchyard expansion is completed, the yard will contain up to twenty oil-filled power transformers of varying sizes. Other new equipment installations will also be similar to those in the present switchyard, including a station service transformer, circuit breakers, and various associated instruments and connections. As is now the case, some equipment will be enclosed in buildings; other equipment will be located outdoors.

Constructing Additional AC/DC Conversion Facilities

Converter equipment will be housed in a steel-frame building, roughly 120 m x 15 m in size and four storeys in height, similar to the existing Bipole II converter building. Within the building, each group of "thyristor valves", the devices that make the AC/DC conversion, will be located in a separate valve hall. Control equipment, auxiliary mechanical and electrical support services, and maintenance facilities will also be situated within the building.

Bipole III is scheduled to begin service in the Year 2000. Two valve groups will be installed initially. These installations will be made consistent with the coming into service of the generating units at Conawapa. Subsequent installations will ultimately achieve the full power transfer capacity of Bipole III. Installation timing of the valve groups and related equipment will be determined by system load growth and generation development considerations. These will also dictate the timing of installation of the eight converter transformers in the 230 kV switchyard.

Constructing an Additional 500 kV DC Switchyard

The new Bipole III DC switchyard, valve halls, and converter transformers will be located on the northwest side of the existing facilities, north of the corresponding Bipole II DC switchyard and converter building. The area needed for this purpose, 220 m x 175 m in size, has previously been reserved within the existing site.

The new switchyard will contain a similar variety of equipment and switchgear to that contained in the existing Bipole II DC switchyard. Ancillary electrical hardware will include power and control cabling, overhead and subsurface grounding, and switching facilities to link Bipole III with the existing Bipole II ground electrode.

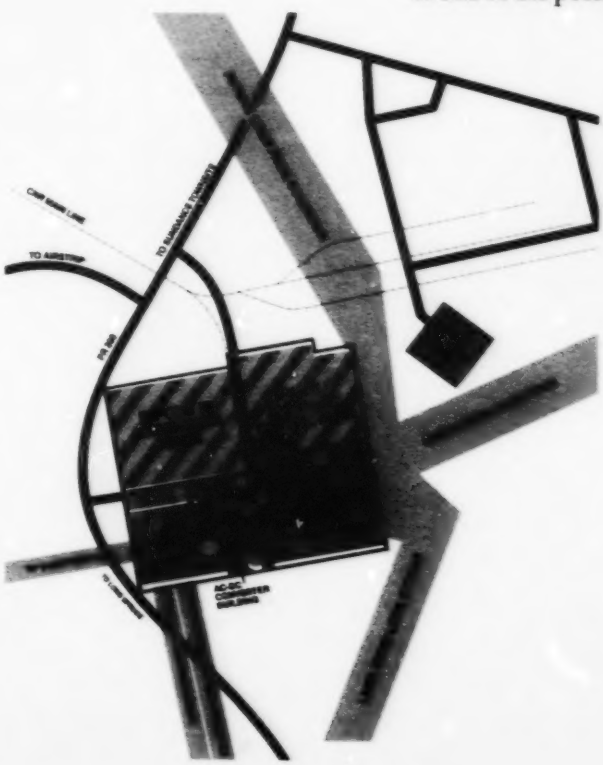
On-Site Improvements

The site area has already been graded and fenced, and is accessible by road and rail. Full development of the site, however, will require a number of on-site improvements, including:

- A maintenance facility for repair of major items of equipment;
- Storage facilities;
- Expanded communications facilities;
- Possible expansion of an existing oil tank farm;
- Oil processing equipment;
- Facilities for a non-resident construction labour force of up to 200 persons at the peak of construction;
- Temporary office accommodation and services for the contractor's construction staff;
- Expansion of existing access roads and staff parking facilities within the station;
- Landscaping near the principal Bipole III building and office facilities;
- Expansion of the sanitary sewer system within the Bipole III site area;
- Installation of buried water distribution pipes for fire protection and firefighting, and to supply domestic plumbing in all buildings; and
- Installation of a buried electrical ground grid for safety purposes.

The Electrode Line

The Henday Upgrade project includes construction of a second low voltage feeder line to the existing Henday Electrode, located some 11 kilometres from the station. The Electrode is essentially a steel ring set under the ground, whose purpose is to enable continued operation of Bipole III in the event of a loss of one of the poles.



Project Setting

The entire Henday Upgrade project will be implemented on existing Manitoba Hydro station property, with the exception of the additional feeder line to the Henday Electrode. This line will be located on Crown land.

Facility Location

Henday Converter Station is located 1.4 kilometres west of Limestone Generating Station, just east of Provincial Road (PR) 290. The aboriginal community of Bird on the Fox Lake Indian Reserve is 3.7 kilometres to the west, and the Hydro townsite of Sundance is approximately 4.8 kilometres to the northeast. The community of Gillam is 35 kilometres southwest of the station.

The Henday Station site totals 16 hectares (40 acres) of cleared and graded property. Existing facilities, originally completed in 1977, occupy about 8.5 hectares, leaving nearly half of the site still available for development. After completion of the proposed Upgrade, the station will be fully developed.

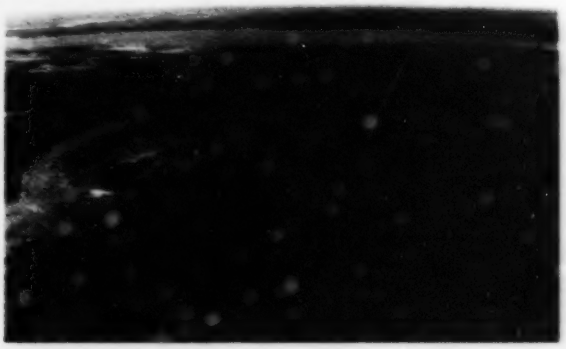
The Henday Ground Electrode is located about 11 kilometres southwest of the station. The new electrode line, strung on wood poles along a cleared 15 metre wide right-of-way, will be routed parallel to the south side of PR 290, on the opposite side of the road from the existing Bipole II electrode line.

Study Area

A basic project study area, defined by a radius of 5 kilometres around Henday, was established within which potential environmental impacts have been identified and assessed. For purposes of socio-economic impact analysis, the communities of Bird, Sundance, and Gillam have been included in the overall study area. An additional study area, 1,000 metres from each side of the proposed electrode line right-of-way, has also been established. The study areas for the incoming and outgoing transmission lines to and from Henday will be separately described in the environmental impact assessments for the Conawapa Generating Station and Henday-Riel HVDC Line, respectively.

The immediate Henday study area is generally flat, with the Nelson River and its tributaries providing the only relief. Subsurface permafrost is widespread, but discontinuous.

The proposed electrode line route along PR 290 crosses similar terrain.



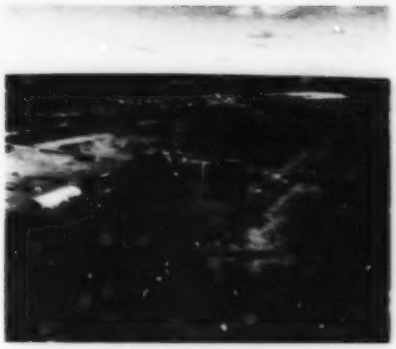
The Henday Ground Electrode, 11 kilometres southwest of the converter station, would require an additional connection with Henday to accommodate converter station expansion resulting from the Conawapa project.

Land Use

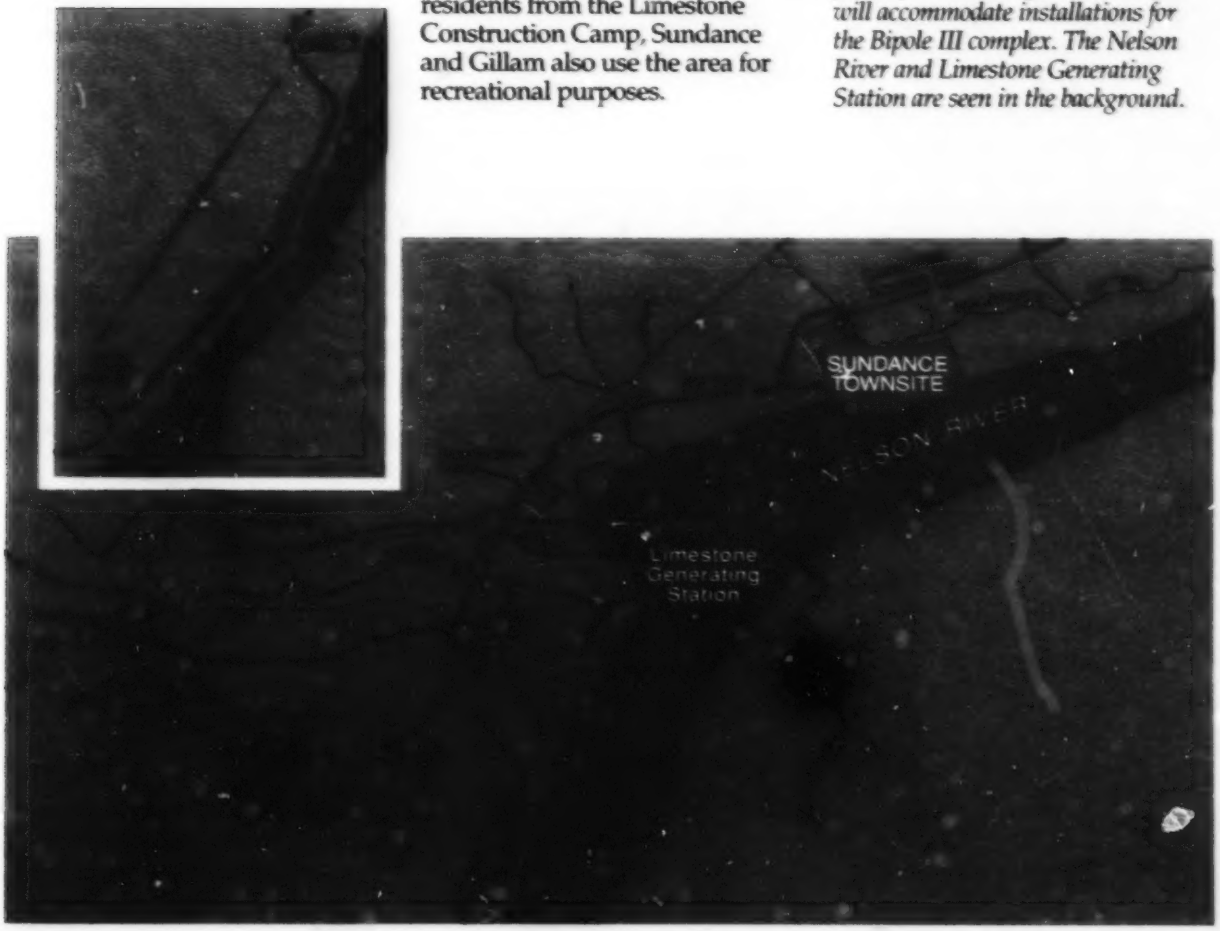
Existing land use in the Henday area is characterized by extensive Hydro development, road and rail transportation facilities, as well as the two small nearby communities of Bird and Sundance.

Various uses associated with Hydro's development of the Limestone Generating Station exist in the vicinity of Henday Station. These include transmission lines, borrow pits, maintenance and equipment areas, and a fully-equipped work camp. While most of the work camp will be moved to the Conawapa site to support its development, some facilities will be retained to accommodate Henday Upgrade construction workers.

In addition to their reserve land, the Fox Lake people use a large adjacent resource area for traditional fishing, trapping, and hunting activities. Other residents from the Limestone Construction Camp, Sundance and Gillam also use the area for recreational purposes.



Henday Station seen from the southwest showing the Bipole II converter building. Undeveloped parts of the station yard to the left will accommodate installations for the Bipole III complex. The Nelson River and Limestone Generating Station are seen in the background.



All proposed modifications and expansions to buildings and equipment at Henday are contained within the existing site and are increments to those now present. The electrode line involves clearing and constructing a new right-of-way along an existing road corridor.

To assess the environmental implications of the Henday Upgrade, Manitoba Hydro has studied the project's potential effects on the physical, biological, and socio-economic environment. Many of these impacts are construction-related and of relatively short duration. They are of three kinds:

1. *Employment and business opportunities;*
2. *Biophysical impacts; and*
3. *Transportation of workers, materials, and heavy equipment.*

All potential adverse environmental and socio-economic impacts resulting from construction activities are expected to be avoidable entirely or reducible to acceptable limits with known technology.

Employment and Business Opportunities

The Henday Upgrade project is estimated to require about 7,100 person-months of construction work. The peak construction year will likely involve about 3100 person-months of direct employment. Of the total amount of construction work, approximately 70 per cent, or almost 5,000 person-months, will be contracted out. Some 3,600 person-months of engineering work will also be required over the course of the project.

Estimated total project costs are $512 million (Year 2000 $) and are expected to result in significant benefits to local residents.

Manitoba Hydro has issued its *Proposed Purchasing, Employment and Training Policies for Northern Projects* (September 1991). A number of these policies, intended to maximize access of northern aboriginal people and other northerners to project contracts, jobs, and training, are applicable to the Henday Upgrade project. For example, Hydro's proposed opportunity-enhancement commitments on purchasing include such measures as sole source and set-aside contracts, smaller work packages, early bid information, Manitoba content provisions, restricted tender calls, encouragement of joint ventures, special purchasing seminars, and technical support.

Employment actions on the project will generally be governed by the existing Burntwood/Nelson Collective Agreement. Consistent with that agreement, special measures will include the establishment of aboriginal employment goals for each trade hired by both Hydro and contractors, a preferential job referral and hiring system, special lay-off provisions, on-the-job training initiatives, employee counselling, cooperative education programs at community colleges, and monitoring and consultation mechanisms.

Aboriginal and other residents of Northern Manitoba will benefit from preferential hiring, smaller work packages, and other supports during development of the Henday Upgrade.

Biophysical Impacts

The Henday Upgrade schedule calls for a 48-month construction period. Commissioning activities will take another six months.

To minimize land and water disturbances, right-of-way clearing and electrode line construction will be scheduled during the winter season. Where possible, permafrost landscapes will be avoided. Vehicles will be restricted to PR 290 and designated access trails.

Clearing will affect only a modest amount of natural vegetation, primarily black spruce, tamarack and low plant communities. Where required, hand clearing will be undertaken to minimize disturbance.

Prior to clearing, Hydro will do right-of-way surveys to detect the presence of rare and endangered species and to identify historical and cultural resources. Should any such species or resources be found, appropriate mitigative measures will be taken.

A buffer will be maintained between the new right-of-way and the Nelson River and other waterbodies. In compliance with provincial water crossing guidelines, special measures will be taken to protect aquatic life from disturbance.

During construction, the potential exists for accidental spills of oils, fuels, or lubricants. Hydro will make best efforts to reduce the risk or magnitude of spills or leaks and will inform its contractors and workers of their environmental and resource protection responsibilities. Potential contaminants will be contained, cleaned up, and disposed of in compliance with applicable government regulations and established Hydro procedures to protect the environment from surface erosion, off-site migration of spilled substances, and ground water contamination.

Transportation

Switchyard expansion at Henday Station and erection of the new feeder line to the Electrode will require the transportation of workers, heavy equipment, and substantial volumes of construction material and station equipment. For example, construction equipment will be brought in and used to prepare foundations and piles, and to haul, hoist, move, and/or assemble electrical equipment. These and related worker movements will produce unavoidable effects on local residents and/or wildlife, such as increased dust, exhaust, and noise. Hydro will ensure that air and noise pollution controls, as may be required on equipment, will be operational and properly maintained.

Transportation movements between the camp facilities at Limestone and Henday will result in increased traffic and additional noise along the existing public roadway. Wide and heavy loads will be transported in clear weather conditions accompanied by appropriate escort and support vehicles.

While most daily movements will be by road, deliveries of major pieces of equipment, particularly the transformers and switchyard steelwork, will make maximum use of the existing rail facilities. Large volumes of transformer insulating oil, ranging from 24,000 litres to 136,000 litres per transformer, will be brought to the site either by rail or truck. None of this oil will contain polychlorinated biphenyls (PCBs).

Appropriate precautions will be taken in order to minimize risk and impact of spills during transport and use of oils or hazardous substances. Further details on these measures are provided in succeeding sections.

The Henday Upgrade will require construction of an additional AC/DC converter building and switchyard installations, similar to these existing facilities at Henday.

The project's long-term effects will be incremental to those arising from Manitoba Hydro's current operations at Henday.

All potential adverse environmental and socio-economic impacts of station operations and maintenance activities, and from contingency events, are expected to be avoidable entirely or reducible to acceptable limits with the use of known technology.

Employment

Henday Station will continue to be manned on a 24 hour basis. Once Bipole III is in service, the number of operations and maintenance staff will be highest during the daytime period, perhaps in the order of 20 persons.

Land Use and Wildlife Impacts

Proposed changes at Henday Station should present no significant conflicts with existing land uses. Normal operation and maintenance activities will have an insignificant impact on wildlife and fish populations or habitat.

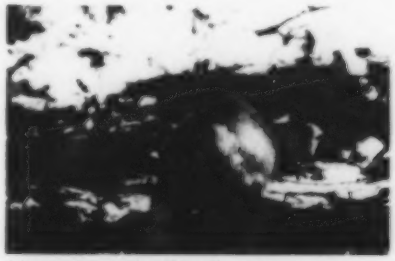
The area around Henday has already been disturbed by previous development. Any additional effects due to noise or traffic will be minimal and incremental to the existing conditions. Wastes will be disposed such that wildlife will not be attracted to the station site or other areas where they could be in danger from vehicles or people. Similarly, it is not expected that operation and maintenance of the electrode line will have any deleterious effect on wildlife and fish populations, habitat, or traditional harvesting, transportation, residential, or other activities.

Electric and Magnetic Fields

As with any electrical equipment, electric and magnetic fields (EMF) will occur at the station and along the associated lines. To date, the weight of scientific evidence on this subject has not established any cause-effect link between EMF exposure and adverse effects on human health. In recognition of the public's concern, Hydro will continue to measure and predict EMF levels at its own facilities, to conduct its own EMF research, and to monitor world-wide scientific studies on the subject.

If ongoing research provides scientific evidence that indicates a need to modify existing practices, Hydro will take whatever prudent measures are required to protect public and employee health and safety.

Measures will be taken during project design to mitigate the potential for electronic interference from EMF and to keep such effects within limits set by the Canadian Standards Association.



Upgrading the Henday Converter Station and constructing a new line to the electrode site are not expected to have any more impacts on fish and wildlife than now occur with the existing facilities.

Visual and Noise Effects

No significant visual impacts should occur as a result of the addition of facilities and equipment at Henday Station. As with the existing station, the additional structures, towers, and lines will be visible especially at night when the facility is lit. The electrode feeder line, because it will be routed along an established road right-of-way, is also expected to be visually acceptable.

The layout, design, and periodic monitoring of the switchyard equipment will ensure that ambient noise levels continue to be within limits set by the Canadian Standards Association and relevant provincial regulations. Enclosure of the valve groups within the converter building will reduce outside noise associated with valve operation and that of the cooling and auxiliary support systems.

Vegetation Control

To ensure employee safety and performance of the facility, Hydro must keep the station site free of vegetation. In addition to manual and mechanical means of controlling weeds and other plants, herbicides have been, and may continue to be, used at Henday. Periodic vegetation control may also have to be done on the electrode line right-of-way.

Storage and application of herbicides will be strictly controlled and will conform to prevailing federal and provincial government legislation. Only registered, non-persistent, substances will be applied by staff who hold an applicator's license issued by the Department of the Environment. Application procedures will minimize or eliminate drifting of spray particles beyond the target area.

Materials and Waste Management

At the present time, a variety of fuels, oils, chemicals, compressed gases, herbicides, and other controlled substances are used and stored at Henday Station. The switchyard expansion will entail a considerable increase in the volume of such on-site materials. Therefore, the precautions now in place at Henday will not only be continued but also improved over the course of the Upgrade project.

Henday's new transformers will contain large volumes of mineral oil specially refined for cooling and insulating purposes. No PCBs will be present in this oil. In accordance with applicable regulations, preventative measures will be established to contain transformer oil or other chemicals on site.

Oil processing will require installation of filters, pumps, and pipes, identical to those now used at Henday and at other substations in the Manitoba Hydro system, and may involve expansion of an existing oil tank farm. Provision for oil containment will be included in the station design.

Inputs and outputs of the power conversion process are limited to electrical energy and heat from the station equipment and facilities. The latter is controlled by closed-loop cooling systems. To date, discharges or effluents at the station have been non-toxic and their effects insignificant. As Henday is already registered with the government in respect to hazardous wastes, Hydro will continue to comply strictly with all government regulations regarding the handling, storage, labelling, transportation, disposal, and emergency management of such materials by trained employees. As required, storage facilities will be equipped with special venting, spill or leak containment, fire safety, and monitoring equipment. Procedures for switchyard cleaning and maintenance will ensure that no oils, solvents, or other materials are allowed to run off the surface of the site.

Domestic refuse, including office papers, packing containers, and other non-toxic materials, will continue to be collected by local government or private contractor. Waste will be disposed of at a nearby landfill site.

Contingency Events

Installation of additional transformers and other electrical equipment at Henday will incrementally increase the risk of fire and associated air emissions.

Failure of 230 kV transformer equipment is rare and seldom results in fire. To minimize the risk and effects of fire, should such an event occur, Hydro uses state-of-the-art design, monitoring and detection technology, modern fire suppression equipment, and trained personnel. Appropriate authorities are informed of all hazardous materials stored or used on-site.

On rare occasions, power lines may break or fall, generally as a result of inclement weather, e.g., ice and wind storms, tornadoes, etc. Hydro has procedures and trained staff in place to detect, isolate, secure, and repair damage to high voltage lines and towers.

As is the case at present, each large transformer will be provided with a water deluge fire protection system. The Limestone water system, which now supplies the station site, has been designed to meet Henday's expansion requirements. In addition to the on-site water distribution facilities, Henday Station has a storage tank with a capacity of 380,000 litres, capable of providing sufficient water to effectively extinguish an oil fire in a few minutes.

The Next Steps

Manitoba Hydro has requested provincial and federal government authorization to develop the Conawapa-Winnipeg Transmission Complex.

Regulatory Process

Before approval can be granted, Hydro must submit environmental impact assessments for all project components, including the Henday Converter Station Upgrade. The Henday document and supporting materials are expected to be submitted to the governments in late 1992.

A joint federal/provincial Environmental Review Panel has been established to undertake the regulatory review and to conduct public hearings on the Conawapa-Winnipeg Transmission Complex. This Panel is responsible for making recommendations to the provincial and federal governments. Before any construction work can begin, the formal approvals of the Manitoba Minister of Environment and his federal counterpart are required.

Following public consultations on the Henday Station Upgrade, Hydro will complete its final environmental assessment report and request authorization to develop the station project, including construction of the electrode feeder line.

Public Consultation and Comment

Throughout this regulatory process, members of the public will have a series of opportunities to make their voices heard. The public consultation program, planned to begin in spring 1992, represents the next important opportunity for interested parties to provide Hydro with their views and suggestions before the final Henday Station Upgrade Environmental Assessment Report is completed.

Once this Report is submitted to the Panel, it will be available to all persons in preparation for public hearings on the project. Anyone may appear before the Panel in support of, or in opposition to, Hydro's proposals.

Manitoba Hydro looks forward to discussing this project with you.